UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHIGEO T. OYAMA

Appeal 2007-3672
Application 10/089,515
Technology Center 1700

Decided: November 20, 2007

Before EDWARD C. KIMLIN, CHARLES F. WARREN,
and THOMAS A. WALTZ, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Primary Examiner's final rejection of claims 1, 3-7, 9-13, and 43. Claims 40-42 are the only other claims pending in this application and stand objected to by the Examiner as depending on a rejected base claim (Br. 5).[1] The Examiner has indicated that claims 40-42 would be allowable if rewritten in independent form to contain all of the limitations as set forth in the independent claim (Final Office Action dated Jan. 25, 2005, page 7;

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[1] We refer to and cite from the "Revised Appellant's Brief Under 37 C.F.R. § 41.37" dated Aug. 18, 2005.

Notice of Non-Compliance dated Aug. 2, 2005; Br. 6). We have jurisdiction pursuant to 35 U.S.C. § 6(b).

According to Appellant, the invention is directed to catalysts useful for hydrotreating hydrocarbon feedstocks where the catalyst comprises a specified metal phosphide complex on a specified high surface area support (Br. 7). Independent claim 1 is illustrative of the invention and a copy of this claim is reproduced below:

1. A catalyst comprising:

a metal phosphide complex having the formula MP_x, wherein M is selected from the group consisting of V, Cr, Mn, Fe, Co, Ni, Nb, Mo, Ta, and W, and wherein x ranges from about 0.1 to about 10; and

a high surface area support of at least $50m^2/g$, wherein the metal phosphide complex is dispersed on the high surface area support, wherein said high surface area support is selected from the group consisting of carbon, silica, titania, thoria, magnesia, zirconia, kaolin, bentonite, kieselguhr, zeolites, and combinations thereof.

The Examiner has relied on the following prior art references as evidence of unpatentability:

Fung (Fung '406)	US 4,359,406	Nov. 16, 1982
Antos	US 4,367,137	Jan. 04, 1983
Fung (Fung '246)	US 4,454,246	Jun. 12, 1984

Nozaki et al. (Nozaki), *Hydrogenation Activity of Metal Phosphides and Promoting Effect of Oxygen,* J. of Catalysis 79, 207-210 (1983).[2]

ISSUES ON APPEAL

[2] This reference is incorrectly cited by the Examiner (Ans. 2, ¶(8)), although the correct name, title, and Journal is given. The Examiner does cite the correct XP number for Nozaki in the statement of the rejection (Ans. 4). We deem this error harmless since Appellant has originally cited this article and is clearly aware of the correct citation (Br. 9).

Claims 1, 3-7, 9-13, and 43 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as unpatentable over Fung '246 or '406 (Ans. 3).

Claims 1, 2, and 4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Nozaki in view of Fung '246 or '406 (Ans. 4).[3]

Claims 1, 3-7, and 9-13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Antos (Ans. 5).

Appellant contends that the Oyama Declaration filed under 37 C.F.R. § 1.132 (hereafter the Oyama Declaration) establishes that the two Fung references and Antos are limited to noble metal phosphides, and the processes of preparation taught by these references would not yield metal phosphides as contemplated by the claimed invention (Br. 13). Appellant contends that the Fung references use direct reduction of compounds in a hydrogen stream, without high temperature calcination, and the evidence in this record establishes that this process would not be successful for producing metal phosphides from non-noble metals (Br. 13-14). Appellant further contends that the Examiner's refusal to consider this uncontroverted data from the Oyama Declaration is in error (Br. 15).

Appellant contends that Antos discloses that it is not known what chemistry is formed during his processes, and the evidence of record establishes that reduction occurs between 550 and 690 ºC (Br. 16).

Appellant contends that Nozaki uses alumina supports, which are not claimed by Appellant, and the evidence of record establishes that alumina is

[3] The Examiner incorrectly includes claim 2 in this rejection but claim 2 has previously been cancelled (Br. 5). Accordingly, we consider only claims 1 and 4 as the rejected claims involved in this rejection.

a relatively poor support, necessitating higher temperatures for reduction (Br. 18).

The Examiner contends that the evidence of record is confusing and contradictory, with data in the Oyama Declaration arising from temperatures below 560ºC while the Fung references teach reduction at temperatures of up to 650ºC (Ans. 6 and 10). The Examiner further contends that Appellant's Specification teaches a reaction temperature of 300-1000ºC (Ans. 7). The Examiner also contends that Antos teaches reduction above 300ºC similar to the Specification (Ans. 9).

The Examiner contends that Appellant's Specification teaches alumina to be an "effective support," the results in the Oyama Declaration are not sufficient to establish superiority, and the data is not even remotely commensurate in scope with the claimed subject matter (Ans. 8).

Accordingly, we determine that the issues presented from the record in this appeal are as follows: (1) Does the evidence of record establish that the methods for producing a metal phosphide as disclosed by Fung '246, Fung '406, and Antos can not produce the metal phosphides of the claims;[4] (2) Does the evidence of record establish that one of ordinary skill in this art would not have been able to prepare the metal phosphides taught by Fung '246, Fung '406, or Antos; and (3) Does the evidence of record establish unexpected results for the claimed supports commensurate in scope with the claimed subject matter as compared with the alumina supports taught by Nozaki?

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[4] We note that Appellant does not argue any particular claim with specificity (*see* the Brief in its entirety). Therefore, we select claim 1 from the grouping of claims in each rejection and decide the grounds of rejection in this appeal on the basis of this claim alone.

We determine that the Examiner has established a prima facie case of anticipation and obviousness, which prima facie case has not been sufficiently rebutted by Appellant's arguments and evidence. Therefore, we AFFIRM all grounds of rejection presented in this appeal essentially for the reasons stated in the Answer, as well as those reasons set forth below.

OPINION

A. The Rejection over Fung'246 or '406

We determine the following factual findings from the record in this appeal:

(1) Fung '246 discloses binary metal phosphides on a support, where the metal may be Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, or Pt, on high surface area supports (about 40 to about 1500 m^2/g) selected from the group consisting of carbon, alumina, silica, silica-alumina, zeolite, kieselgehr, vermiculite, and certain specified refractory oxides (Ans. 4; *see* Fung '246, Abstract; col. 1, ll. 10-17; col. 3, ll. 15-48; col. 4, ll. 3-15; col. 7, ll. 19-25; and col. 8, ll. 41-43);

(2) Fung '246 discloses a specific example of nickel phosphide (col. 3, ll. 52-54);

(3) Fung '246 discloses a method of preparation for binary metal phosphides including the steps of impregnating the high surface area support with a solution of one or more water soluble Group VIII metal salts, impregnating the support with a phosphorus source, reducing the composition at a temperature of about 200 to about 650 °C in a reducing atmosphere of hydrogen "for a time sufficient to generate

the desired amount of highly dispersed" metal-phosphorus compound (col. 4, l. 55-col. 5, l. 8; col. 6, ll. 5-31; col. 6, ll. 55-57; and col. 7, ll. 5-7); and

(4) Fung '246 teaches that the duration of the reduction-heating step depends upon three parameters: (1) the temperature of the heating step; (2) the particular metal generated; and (3) the extent of the metal-phosphide conversion desired (col. 6, ll. 44-46).[5]

Appellant does not contest that the Fung references disclose metal phosphides on high surface area supports within the scope of the claimed subject matter (*see* the Brief in its entirety and factual findings (1) and (2) listed above). Appellant's sole argument concerning the Fung references is that these references employ a direct reduction method, without a high temperature calcination, which is incapable of producing metal phosphides within the scope of the claims, i.e., non-noble metal phosphides (Br. 13-16, citing the data presented in the Oyama Declaration).

Appellant must overcome a strong presumption that the process of a patent if used by one skilled in the art will produce the results alleged by the patentee. *See In re Weber,* 405 F.2d 1403, 1407 (CCPA 1969)("We do not think that appellants' mere showing that it is possible to operate within Mautner's disclosure without obtaining his results is sufficient to overcome the strong presumption that the process of a patent if used by one skilled in the art will produce the results alleged by the patentee. [Citation omitted]."). To be prior art under § 102(b), a reference must put the anticipating subject

[5] Fung '406 has essentially the same disclosure as Fung '246 (*see* the "Related U.S. Application Data" in Fung '246). Therefore, in the interest of judicial economy, we do not repeat the same factual findings for Fung '406.

matter at issue into the possession of the public through an enabling disclosure. *See In re Donohue,* 632 F.2d 123, 125-26 (CCPA 1980). Use of other references to show that the method of preparation referred to in a patent was in possession of the public is proper. *In re Donohue,* 632 F.2d at 126. We determine that the data in the Oyama Declaration is not sufficient to establish that the supported non-noble metal phosphides disclosed by Fung '246 or '406 could not have been prepared by the methods taught by the Fung patents or could not have been prepared by methods known by one of ordinary skill in this art. As stated by the Declarant, a person of ordinary skill in this art "would typically hold a Ph.D and typically with [sic] 5-15 years research experience after graduation" as well as "have access to a variety of trade journals and reference books" in the fields of chemistry, chemical engineering, and catalysis (Oyama Declaration 3). Appellant does not contest or dispute that Nozaki, as discussed below, discloses a method of preparing nickel, cobalt, and iron phosphides on a high surface area support (Br. 18). Accordingly, the Declarant has failed to explain why one of ordinary skill in this art would not have been aware of Nozaki, and the method of preparation taught therein.

With regard to the data attempting to show that the method of the Fung references does not produce the claimed metal phosphide complex, we determine that the evidence is insufficient for the following reason. The burden rests with those submitting unobvious results to indicate or explain why the results are persuasive or unexpected. *See In re Klosak,* 455 F.2d 1077, 1080 (CCPA 1972); *Ex parte Gelles,* 22 USPQ2d 1318, 1319 (BPAI 1992). As shown by factual findings (3) and (4), the process of preparation of the metal phosphide complexes as taught by Fung '246 and '406 depends

on the duration of the reduction-heating step, which itself is dependent on three factors, including the type of metal phosphide complex and the extent of conversion desired. The Oyama Declaration is silent as to the duration of the reduction step or the amount of phosphide produced (Oyama Declaration 4-5). Therefore we determine that the comparative method does not follow the method as taught by the Fung references.

For the foregoing reasons, we affirm the rejection of claims 1, 3-7, 9-13, and 43 under § 102(b)/§ 103(a) over Fung '246 or '406.

B. The Rejection over Nozaki in view of Fung '246 or '406

We determine the following factual findings from the record in this appeal:

(5) Nozaki discloses nickel, cobalt, and iron phosphide catalysts, each on an alumina support with a surface area of approximately 100 m^2/g, and a method of preparing these catalysts (Nozaki 207);

(6) Fung '246 or '406 teach the use of various high surface area supports for nickel, cobalt, and iron phosphide complex catalysts (e.g., *see* Fung '246, Abstract; col. 1, ll. 10-17; col. 3, ll. 15-24; col. 4, ll. 3-15; and col. 8, ll. 41-43).

As correctly found by the Examiner, the only difference between the subject matter of claim 1 on appeal and the disclosure of Nozaki is the use of an alumina support instead of the claimed supports (Ans. 4; *see* factual finding (5) listed above). As also correctly found by the Examiner, the Fung references teach the relative equivalence of alumina supports with many other supports in the metal phosphide catalyst art (Ans. 5; *see* factual finding (6) listed above). Accordingly, we determine that the Examiner has

established a prima facie case of obviousness for the substitution of other equivalent supports for the alumina disclosed by Nozaki. *See In re Fout,* 675 F.2d 297, 301 (CCPA 1982) ("Express suggestion to substitute one equivalent for another need not be present to render such substitution obvious.").

Appellant's sole argument against this rejection is that the Oyama Declaration demonstrates that use of alumina as a support necessitates higher temperatures for reduction, and thus alumina "is a relatively poor support for phosphides" (Br. 18; *see also* Oyama Declaration 7-8).

We determine that the Oyama Declaration evidence is not convincing for the following reasons. We determine that Appellant's own Specification teaches that of the many possible supports "[p]ference is given to alumina or silica or combinations thereof" (Specification 10:10-11). We determine that the first example disclosed by Appellant's Specification employs a gamma-alumina support (Specification 12: Example 1). We also determine that the Oyama Declaration does not specify what type of alumina is compared, i.e., alpha-, beta-, or gamma- (Oyama Declaration 8). As correctly stated by the Examiner (Ans. 8), the evidence of record is not commensurate in scope with the subject matter sought to be patented. *See In re Dill,* 604 F.2d 1356, 1361 (CCPA 1979). The comparative data is limited to a few specific metal phosphides and supports while the claims on appeal are not so limited. We further determine that Example 1 of the Specification discloses a final reduction temperature of only 850 ºC for a MoP complex on alumina,[6] while Example 2 "was prepared in the same manner as in example 1" except that the support was silica (Specification 13). However, the Specification does

[6] We note this value is not the same as found in the Oyama Declaration at page 7 (referring to the Clark article with a 900 ºC reduction temperature).

not state that a lower reduction temperature was needed for this silica support. Furthermore, the Oyama Declaration does not state that the differences in reduction temperature are unexpected and of practical significance. *See In re Klosak, supra.* The mere fact that the reduction temperatures of two supports differ would be but one factor considered by those of ordinary skill in this art. It would appear that the activity of a particular catalyst on a particular support would be a more critical property.

For the foregoing reasons, we affirm the rejection of claims 1 and 4 under § 103(a) over Nozaki.

C. The Rejection over Antos

We determine the following factual findings from the record in this appeal:

(7) Antos discloses a catalyst composite comprising effective amounts of Pt, Co, Sn, P, and a halogen with a porous carrier having a surface area of 25-500 sq.m/g (Abstract; col. 1, ll. 21-25; col. 3, ll. 18-23; col. 4, ll. 54-68); and

(8) Antos discloses that "[a]lthough the precise chemistry of the cobalt component in the final catalytic composite is unknown," the key essential ingredient is the phosphorus component which is intimately related with the cobalt component, and "best results are obtained when the phosphorus component exists in the catalytic composite substantially in the form of a phosphide with the cobalt component" (col. 10, ll. 54-59; and col. 14, ll. 27-44).

As shown by factual findings (7) and (8) listed above, we determine that Antos disclosed or would have suggested to one of ordinary skill in this

art cobalt phosphide catalysts on a high surface area support within the scope of claim 1 on appeal.

Appellant's sole argument concerning this rejection is that the evidence of record, namely the Oyama Declaration, establishes that the process taught by Antos does not result in the formation of a metal phosphide (Br. 16).

We determine that the Oyama Declaration evidence is not convincing for the following reasons. First, we note that Declarant has not repeated Example II of Antos and shown that no cobalt phosphide was formed in this example. Second, the mere citation of the Goodenough and Wang articles (Declaration 6) does not establish that lower temperatures would not be effective, depending on other factors, such as the duration of the reduction, the flow rate of hydrogen, etc. Third, Antos teaches that higher temperatures can be employed in the reduction (up to 648 ºC; *see* col. 15, ll. 18-25). Fourth, as discussed above, one of ordinary skill in this art would have been aware of other processes for preparing cobalt phosphide on a high surface area support (*see* Nozaki).

For the foregoing reasons, we affirm the rejection of claims 1, 3-7, and 9-13 under § 103(a) over Antos.

D. Other Issues

In the event of continuing or further prosecution of the subject matter of this appeal, the Examiner and Appellant should determine the patentability of any claims in view of the prior art article to Robinson.[7] Similarly to Nozaki, Robinson discloses nickel or cobalt phosphide catalyst

[7] Robinson et al. (Robinson), *Phosphorus Promotion of Ni(Co)-Containing Mo-Free Catalysts in Quinoline Hydrodenitrogenation,"* J. of Catalysis **161,** 539-550 (1996), previously made of record.

complexes on high surface area supports such as alumina and silica (Robinson 539). Robinson also teaches three different methods of preparing these supported catalysts, including a method with a high temperature calcination step before a reduction step (Robinson, Abstract; 539-541). Furthermore, Robinson teaches that nickel phosphide per se is a commercial material that can be purchased (Robinson 540).

E. Conclusion

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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sld/ls

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